

7.1

Ratio and Proportion

Goal Use ratios and proportions.

VOCABULARY

Ratio

Proportion

Means

Extremes

Example 1 Simplify Ratios

Simplify the ratio.

a. 60 cm : 200 cm

b. $\frac{3 \text{ ft}}{18 \text{ in.}}$

Solution

a. 60 cm : 200 cm can be written as the fraction $\frac{60 \text{ cm}}{200 \text{ cm}}$.

Divide the numerator and the denominator by their greatest common factor, 20.

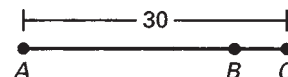
$$\frac{60 \text{ cm}}{200 \text{ cm}} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

b. Before you can simplify this ratio, the quantities in the numerator and denominator must be written in the same units. To use inches, substitute 12 in. for 1 ft.

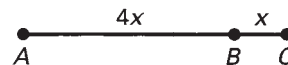
$$\frac{3 \text{ ft}}{18 \text{ in.}} = \frac{3 \cdot \boxed{\quad}}{18 \text{ in.}} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Example 2 Use Ratios

In the diagram, $AB : BC$ is $4 : 1$ and $AC = 30$. Find AB and BC .

**Solution**

Let $x = BC$. Because the ratio of AB to BC is 4 to 1, you know $AB = \underline{\hspace{1cm}}$.



$$AB + BC = AC \quad \text{Segment Addition Postulate}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \quad \text{Substitute.}$$

$$\underline{\hspace{1cm}} = \underline{\hspace{1cm}} \quad \text{Add like terms.}$$

$$x = \underline{\hspace{1cm}} \quad \text{Divide each side by } \underline{\hspace{1cm}}.$$

To find AB and BC , substitute your value for x .

$$AB = \underline{\hspace{1cm}} = \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \quad BC = x = \underline{\hspace{1cm}}$$

Answer $AB = \underline{\hspace{1cm}}$ and $BC = \underline{\hspace{1cm}}$.

Example 3 Use Ratios

The perimeter of a rectangle is 80 feet. The ratio of the length to the width is $7 : 3$. Find the length and the width.

Solution

The ratio of length to width is $\underline{\hspace{1cm}}$ to $\underline{\hspace{1cm}}$, you can let the length $l = \underline{\hspace{1cm}}$ and the width $w = \underline{\hspace{1cm}}$. Draw the rectangle at the right and label side lengths.

$$2l + 2w = P \quad \text{Formula for perimeter of a rectangle}$$

$$2(\underline{\hspace{1cm}}) + 2(\underline{\hspace{1cm}}) = 80 \quad \text{Substitute.}$$

$$\underline{\hspace{1cm}} = 80 \quad \text{Multiply.}$$

$$\underline{\hspace{1cm}} = 80 \quad \text{Add like terms.}$$

$$x = \underline{\hspace{1cm}} \quad \text{Divide each side by } \underline{\hspace{1cm}}.$$

To find length and width, substitute your value for x .

$$l = \underline{\hspace{1cm}} = \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \quad w = \underline{\hspace{1cm}} = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

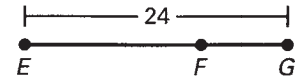
Answer The length is $\underline{\hspace{1cm}}$ feet and the width is $\underline{\hspace{1cm}}$ feet.

Follow-Up Check your answer for Example 3.

$$2l + 2w = 2(\underline{\hspace{1cm}}) + 2(\underline{\hspace{1cm}}) = \underline{\hspace{1cm}} \quad P = \underline{\hspace{1cm}}$$

✓ **Checkpoint** Complete the following exercises.

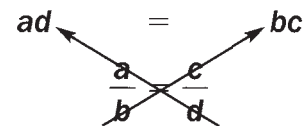
1. In the diagram, $EF:FG$ is $2:1$ and $EG = 24$. Find EF and FG .



2. The perimeter of a rectangle is 84 feet. The ratio of the length to the width is $4:3$. Find the length and the width of the rectangle.

CROSS PRODUCT PROPERTY

Words In a proportion, the product of the extremes is equal to the product of the
_____.



Symbols If $\frac{a}{b} = \frac{c}{d}$, then $\underline{\hspace{1cm}} = \underline{\hspace{1cm}}$.

Solve a Proportion

Solve the proportion $\frac{5}{3} = \frac{y + 2}{6}$.

Solution

$$\frac{5}{3} = \frac{y + 2}{6}$$

Write the original proportion.

(5)() = (3)()

Cross product property

[illegible]

Multiply and use distributive property.

Subtract **from each side.**

Divide each side by ____.

Checkpoint Solve the proportion.

$$3. \frac{3}{x} = \frac{6}{8}$$

4. $\frac{5}{3} = \frac{15}{y}$

$$5. \frac{m+2}{5} = \frac{14}{10}$$